NETL Amine-Based Solid Sorbents for Post-Combustion CO_2 Capture

Objectives:

- Develop solid, durable, regenerable sorbents having high selectivity and high adsorption capacity for CO_2 at conditions suitable for post-combustion capture.
- Ensure that engineering and reactor design issues are addressed in parallel with sorbent development.
- Ultimately meet the programmatic goal for energy conversion systems that can remove 90% CO_2 while keeping the increase in cost of energy service below 35%.

Initial Systems Study for a Temperature Swing Application

- Established success criteria for sorbents related to sorbent CO_2 working capacity, energetics, and physical and chemical properties.
- Detailed potential reactor schemes for sorbent use in temperature swing applications.

Sorbent Development

- Two types of amine enriched sorbents developed:
  - Immobilized amine sorbents
  - Encapsulated organics with clay substrate

- Properties initially measured and indicate that sorbents could reduce the regenerative heat duty.
- Information on impact of flue gas components (SO_2, NO_x, and H_2O) being assembled.
- Consistent results in experimentation with sorbents on various internal test units and corroborated with outside testing (TVA and ADA-ES).

Future and Progress Forward

- Energetics of sorbent systems will be re-visited once all pertinent information on each sorbent is compiled.
- Computational modeling of reactor systems will be conducted using the properties and kinetics determined experimentally.
- Technology transfer actions are being pursued.